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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/744,877	01/29/2001	Aomar Halimaoui	5310-03000	8711

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EXAMINER

NOVACEK, CHRISTY L

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 12/03/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/744,877

Applicant(s)

HALIMAOUI ET AL.

Examiner

Christy L. Novacek

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other:

### **DETAILED ACTION**

This Office Action is in response to the communication filed January 29, 2001.

#### ***Specification***

The disclosure is objected to because of the following informalities:

At line 15 of page 2, "other others" should be deleted.

In Table 1 on page 4, some of the columns of the Table are out of alignment.

The sentence beginning at line 21 on page 4 does not make sense as written.

Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation of implanting an "effective dose of atoms". The meaning of the term "effective" is in this context.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-11 and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by

Tzeng.

In reference to claims 1, 3 and 8, Tzeng discloses implanting ions (28) into predetermined regions of a silicon substrate (20) (Fig. 4; col. 5, ln. 36-41; col. 5, ln. 61-65). The implanted ions increase the rate of oxidation of the substrate and, thereby, a silicon oxide layer (30/31) of non-uniform thickness is grown by oxidizing the surface of the substrate (Fig. 5; col. 5, ln. 61-col. 6, ln. 22).

In reference to claim 2, the implanted ions may be argon or "any one of the group III-IV dopants" (col. 5, ln. 61-col. 6, ln. 8). Group III-IV elements include silicon and germanium.

In reference to claims 4 and 9-11, the ions are implanted at an energy of 40 keV (col. 6, ln. 1-2).

In reference to claims 5 and 13-16, in one example, argon ions are implanted at a dose of "approximately  $4.0 \times 10^{14}$  atoms/cm<sup>2</sup>" (col. 6, ln. 1-3).

In reference to claims 6 and 7, the oxidation step is conducted in a furnace in an oxidizing atmosphere at a temperature of around 950°C (col. 6, ln. 9-15).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tzeng.

In reference to claim 12, as stated above in reference to claims 5 and 13-16, in one example, Tzeng discloses implanting argon ions at a dose of “approximately  $4.0 \times 10^{14}$  atoms/cm<sup>2</sup>” but does not specifically disclose implanting the ions at a concentration between  $1 \times 10^{15}$  and  $5 \times 10^{15}$  (col. 6, ln. 1-3). However, at the time of the invention, it would have been obvious to one of ordinary skill in the art to use routine experimentation to determine the appropriate dose of ions to implant that will form the thickness of oxide desired in any particular application. One of ordinary skill in the art would recognize that the amount of ions implanted may be adjusted according to the species of ion implanted, the thickness of the oxide required, and the oxidation process used to form the oxide layer because such variables of art recognized importance are subject to routine experimentation and discovery of an optimum value for such variables is obvious. See *In re Aller*, 105 USPQ 233 (CCPA 1955).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kim is cited to show a process of forming a silicon oxide layer of non-uniform thickness, wherein the variation in oxide thickness is accomplished by implanting oxidation-rate-enhancing dopants including argon and silicon into predetermined portions of a semiconductor substrate.

Fulford, Jr. et al. is cited to show a process of implanting ions of argon, germanium or silicon into a portion of a silicon substrate wherein it is desired to increase the oxidation rate of the silicon. The ions are implanted at a dose of “greater than approximately  $1 \times 10^{14}$  atoms/cm<sup>2</sup>”.

Leung et al. is cited to show a process of forming a silicon oxide layer of non-uniform thickness, wherein the variation in oxide thickness is accomplished by implanting oxidation-rate-enhancing dopants including germanium and silicon into predetermined portions of a semiconductor substrate.


Nomura et al. is cited to show a process of forming a silicon oxide layer of non-uniform thickness, wherein the variation in oxide thickness is accomplished by implanting oxidation-rate-enhancing dopants into predetermined portions of a semiconductor substrate. Nomura states that if the oxide layer is to be formed deep into the substrate, light atoms such as helium may be used in addition to heavier atoms to create the regions of higher oxidation rate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (703) 308-5840. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

CLN  
November 21, 2001

  
CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800